Title: Method and Apparatus for Providing a Computerised Television Apparatus

Field of the invention

This invention relates to a method and an apparatus for use in providing electronic communication. It is particularly applicable to systems and methods for use in visual communication, audio communication and telecommunications, such as may be used in the field of television and computer networks.

Background of the Invention

It is know in the art to use a computer to display a television signal while maintaining the functionality of the computing apparatus. Similarly, it is also known in the art to use a television apparatus to access computer networks such as Intranets and the Internet.

A common approach using a computing apparatus is providing a television signal processor card adapted to receive a television signal. The television signal processor card, herein referred to as a TV adapter card, is operative to process a television signal received at an input for display on a monitor of the computing apparatus. This type of card is described in U.S. Patent Number 5,192,999 whose contents are hereby incorporated by reference. Typically, the TV adapter card is inserted into a slot of the casing enclosing the computing apparatus.

A deficiency in the above-noted system is a poor display image. Typical computing apparatus monitors use a dot pitch approximate to 0.28 mm of dimension, while standard television monitors use a dot pitch of about 0.93 mm. Frequently, the resulting display image is diffuse and lacks brilliance.

Another deficiency in systems of the type described above is a lengthy initiation process for the computing apparatus. Indeed, such systems, before being operative to display a television signal on the monitor, require an operating system to be activated by the apparatus. Typical systems make use of a BIOS to boot. A typical BIOS on power up searches the computing apparatus to identify its hardware elements. This generally includes identifying which processor is being used in the computing apparatus, what is the bus architecture, what are the peripherals, what is the memory that is available amongst others. Once the hardware elements have been identified, program elements such as drivers are invoked. Such an activation process typically requires in excess of a minute to complete, which may be aggravating to the user of the system. An additional deficiency with the use of a TV adapter card in the computing apparatus relates to memory fragmentation. Typically, the television signal requires intensive processing by the computing apparatus' central processing unit, as well as requires the use of memory units in the computing apparatus. Typically, the use of the computing apparatus to display television images causes the memory to become increasingly fragmented. This often causes the computing apparatus to become inoperable requiring the computing apparatus to be restarted.

Another commonly used solution is to provide an adapter commonly referred to as set top box, operative to be coupled to a conventional television apparatus. Such set top boxes allow an interface between computer type information data elements, such as Web pages, and a television apparatus to be established. Functionally, a set top box is operative to receive a signal indicative of data in a form suitable for processing by computing apparatus and map this data into a display signal suitable for display by a conventional television. A typical 21-inch screen television has a dot pitch approximate to 0.93mm. Such top boxes are well known in the art to which this invention pertains and will not be described further.

A deficiency of the above-described set top box in combination with a conventional television apparatus is that the dot pitch of .93 mm for a 21 inch viewing size screen does not provide sufficient precision for the display of images indicative of letters commonly found in computer displays. Consequently, the display image is blurry and lacks precision often to the point of being aggravating for the user to read.

Another deficiency with the use of a conventional television screen is the lack of resolution of the conventional television screen, in particular for the display of Web pages. Typical Web pages are designed to be displayed on computer monitors having standard resolutions of 640 x 480, 800 x 600 or higher. Conventional television screens have a lower resolution than the average computer monitor.

Another commonly used solution is to provide an adapter commonly referred to as set top box, operative to be coupled to a conventional television apparatus. Such set top boxes allow an interface between computer type information data elements, such as Web pages, and a television apparatus to be established. Functionally, a set top box is operative to receive a signal indicative of data in a form suitable for processing by computing apparatus and map this data into a display signal suitable for display by a conventional television. A typical 21-inch screen television has a dot pitch approximate to 0.93 mm. Such top boxes are well known in the art to which this invention pertains and will not be described further.

A deficiency of the above-described set top box in combination with a conventional television apparatus is that the dot pitch of .93 mm for a 21 inch screen does not provide sufficient precision for the display of images indicative of letters commonly found in computer displays. Consequently, the display image is blurry and lacks precision often to the point of being aggravating for the user to read.

Another deficiency with the use of a conventional television screen is the lack of resolution of the conventional television screen, in particular for the display of Web pages. Typical Web pages are designed to be displayed on computer monitors having standard resolutions of 640 x 480, 800 x 600 or higher. Conventional television screens a have lower resolution than the average computer monitor.

Consequently, the display image is in form different of that intended by the image creator.

Consequently, there is a need in the industry to provide a computerized television apparatus capable of providing an improved display image for both a television signal and computer data.

Summary of the Invention

In accordance with a broad aspect, the invention provides a computerized television apparatus comprising a computing device, a video path and a display unit. The computing device is for generating a first display signal. The computing device has an output for releasing the first display signal. The video path comprise a first input coupled to the computing device for receiving the first display signal, a second input for receiving a second display signal derived from a television signal. The video path further comprises an output for releasing a third display signal. The display unit has an input coupled to the output of the video path. The display unit has a given dimension and is operative to display a display image derived from the third display signal. The display unit is characterized in having a dot pitch that is in a range extending from about 0.0008528 times the given dimension to about 0.00125 times the given dimension.

Advantageously, by providing a display unit characterized in having a dot pitch in a range extending from about 0.0008528 times the given dimension to about 0.00125 times the

Consequently, the display image is in a form different of that intended by the image creator.

Consequently, there is a need in the industry to provide a computerized television apparatus capable of providing an improved display image for both a television signal and computer data.

Summary of the Invention

In accordance with a broad aspect, the invention provides a computerized television apparatus comprising a computing device, a video path and a display unit. The computing device is for generating a first display signal. The computing device has an output for releasing the first display signal. The video path comprises a first input coupled to the computing device for receiving the first display signal, a second input for receiving a second display signal derived from a television signal. The video path further comprises an output for releasing a third display signal. The display unit has an input coupled to the output of the video path. The display unit has a given diagonal viewing dimension and is operative to display a display image derived from the third display signal. The display unit is characterized in having a dot pitch that is in a range extending from about 0.0008528 times the given diagonal dimension to about 0.001016 times the given diagonal dimension. A preferred range is from about 0.0008528 times the given diagonal dimension to about 0.0009473 times the given diagonal dimension. The optimal dot pitch in accordance with the invention is about 0.000862 times the given diagonal dimension.

Advantageously, by providing a display unit characterized in having a dot pitch in a range extending from about 0.0008528 times the given dimension to about 0.001016 times the

given dimension, a improved display image suitable for both a television signal and computer data is obtained.

In a specific example of implementation, the second display signal bypasses the computing device.

Advantageously, by having the second display signal bypass the computing device, intensive processing of a television derived signal is avoided thereby avoiding memory fragmentation in the computing device.

Preferably but not essentially, the computerized television apparatus comprises a first coupling member adapted to receive a television signal, the first coupling member being coupled to the second input of the video path. The computerized television apparatus further comprises a second coupling member coupled to the computing device, the second coupling member being adapted to receive a signal indicative of information data elements, the information data elements being suitable for use by the computing device.

In accordance with another aspect, the invention provides a computerized television apparatus comprising a fast boot-up computing device for generating a display signal. The fast boot-up computing device has an output for releasing the display signal and includes a plurality of hardware elements. The fast boot-up computing device comprises an initial program loader unit comprising a data structure including a plurality of data elements associated to respective hardware elements. The fast boot-up computing device further comprises a plurality of program elements associated to respective

hardware elements, the program elements being adapted to cooperate with selected ones of the hardware elements. The fast boot-up computing device is operative to process the initial program loader unit to invoke the program elements associated to the respective data elements and is operative to boot-up the computerized television apparatus.

An advantage of providing a fast boot-up computing device comprising an initial program loader unit is that, when the computerized television apparatus in powered-on, the booting process occurs by scanning the data elements in the initial program loader unit and invoking the program element associated to each respective data element. This removes the requirement for the computing device to search for the hardware elements thereby reducing the boot time.

For the purpose of this specification, the expression "display signal" is used to designate an electric or electronic representation of an image suitable to be displayed by a display unit such as a cathode ray tube or any other suitable display device. In specific example, the display signal is an analog signal in an RGB format.

Other aspects and features of the present invention will become apparent to those ordinarily skilled in the art upon review of the following description of specific embodiments of the invention in conjunction with the accompanying figures.

Brief Description of the Drawings

Fig. 1 shows a high-level block diagram of a computerized television apparatus in accordance with the spirit of the invention;

Fig. 2 shows a detailed block diagram of the display unit depicted in figure 1;

Figure 3 shows a specific example of the video path depicted in figure 1;

Figure 4 show a block diagram of a computing device in accordance with an embodiment of the invention;

Figure 5 shows a block diagram of an alternative embodiment of the video path depicted in figure 1;

Figure 6 shows a detailed block diagram of a computerized television apparatus in accordance with the spirit of the invention.

Detailed Description

In a first form of implementation, as shown in figure 1, the invention provides a computerized television apparatus 2 comprising a computing device 104, a video path 106 and a display unit 102. The video path 106 receives a first display signal from the computing device 104 at a first input 110 and a second display signal at a second input 108. In a specific example of implementation, the second display signal bypasses the computing device 104. The video path releases a third display signal at an output 140 for use by the display unit 102 for generating a display image.

The display unit 102 has an input coupled to the output 140 of the video path 106. The display unit 102 is operative

for displaying a display image derived from the third display signal. In a specific example of implementation, the display unit 102 is a cathode ray tube. The display unit 102 has a given diagonal viewing dimension and is characterized in having a dot pitch in a range from about 0.0008528 times the given diagonal dimension to about 0.001016 times and preferably in a range from about 0.0008528 times the given diagonal dimension to about 0.0009473 times the given diagonal dimension. A specific example of the display unit is shown in detail in figure 2 of the drawings. The display unit 102 comprises a display surface 250, a cathode ray tube gun controller unit 202 and a deflection controller 19. The display surface 250 has a given diagonal dimension. For a specific substantially rectangular display surface, the given diagonal dimension is a diagonal measurement 252 of the display surface. The display surface 250, cathode ray tube gun controller unit 202 and deflection controller 19 are adapted to generate a dot pitch in an range of about 0.000862 times the given diagonal dimension. Cathode ray tube gun controller units and deflection controllers are well known in the art to which this invention pertains and will not be described further.

The computing device 104 is operative to generate a first display signal and has an output for releasing the first display signal. A specific example to the computing device 104 is shown in detail in figure 4 of the drawings. The computing device 104 comprises a central processor 4 and a memory unit coupled to the central processor 4. In a first form of implementation, the central processor is a general-purpose digital processor adapted to execute instructions defined by a program element. In this first form of implementation, the memory unit comprises at least one program element suitable to be executed by the central processor 4.

for displaying a display image derived from the third display signal. In a specific example of implementation, the display unit 102 is a cathode ray tube. The display unit 102 has a given dimension and is characterized in having a dot pitch in a range from about 0.0008528 times the given dimension to about 0.00125 times the given dimension. A specific example of the display unit is shown in detail in figure 2 of the drawings. The display unit 102 comprises a display surface 250, a cathode ray tube gun controller unit 202 and a deflection controller 19. The display surface 250 has a given dimension. For a specific substantially rectangular display surface, the given dimension is a diagonal measurement 252 of the display surface. The display surface 250, cathode ray tube gun controller unit 202 and deflection controller 19 are adapted to generate a dot pitch in an range from about 0.0008528 times the given dimension to about 0.00125 times the given dimension. Cathode ray tube gun controller units and deflection controllers are well known in the art to which this invention pertains and will not be described further.

The computing device 104 is operative to generate a first display signal and has an output for releasing the first display signal. A specific example of the computing device 104 is shown in detail in figure 4 of the drawings. The computing device 104 comprises a central processor 4 and a memory unit coupled to the central processor 4. In a first form of implementation, the central processor is a general-purpose digital processor adapted to execute instructions defined by a program element. In this first form of implementation, the memory unit comprises at least one program element suitable to be executed by the central processor 4.

More specifically, the memory unit may be partitioned into a data memory unit 6 and a program memory unit 8 where the data memory stores data elements for use by the central processor 4 and the program memory 8 stores programs for use by the central processor 4. In a specific example, the program element is operative for generating a display signal indicative of a web page when executing on the central processor 4. In a second form of implementation, the central processor is a task specific processor adapted to implement a specific processing operation on a given input data stream. In this second form of implementation, the memory unit comprises data elements suitable to be processed by the central processor 4. This second form of implementation is not as flexible as the first form. This will become apparent in light of a specific example. To modify the central processor implemented in accordance with the first form to introduce new functionality, all that is required is to modify the program memory 8. This can be achieved by providing the computing device 104 with an external communication port, such as a disk drive, network connection or interface device, thereby allowing to store the new program element in the program memory. In the second form of implementation where the central processor is a task specific processor, the central processor 4 would have to be replaced by a new central processor implementing the new functionality.

The program element executing on the central processor 4 is operative to generate data elements indicative of a display signal. The data elements representative of a display signal may further comprise control information allowing the central processor and an external device to communicate. The data

elements indicative of a first display signal are released by the central processor 4.

The video path 106 has a first input 110 coupled to the computing device 104 for receiving the first display signal. The video path further comprises a second input 108 for receiving a second display signal derived from a television signal. The video path further comprises an output 140 for releasing a third display signal. The person skilled in the art will readily appreciate that the video path may comprise in excess of the two inputs without detracting from the spirit of the invention. In a first specific example of implementation, the video path comprises a display controller operative to selectively enable the transmission of either one of the first display signal received at the first input 110 and the second display signal received a the second input 108. The selection by the video path of first display signal or the second display signal may be effected by a control signal received from a third input to the video path. Continuing with this first specific example, the third display signal released at the output 140 is indicative of a display signal selected from the group consisting of the first display signal and the second display signal. In a second specific example of implementation, as illustrated in figure 3, the video path comprises a central processor 300 and a memory unit 302. The central processor 300 is operative to process the first display signal and the second display signal to derive the third display signal, the third display signal being indicative of a display signal that is a combination of the first display signal and the second display signal. The memory unit 302 comprises at least one

program element suitable to be executed on the central processor 300 for allowing the central processor 300 to process the signals received at the first and second inputs of the video path. For example, the memory unit may contain a program element allowing the simultaneous display of the first display signal and the second display signal on the display unit 102 using picture-in-picture techniques. The memory unit may contain any suitable image-processing program without detracting from the spirit of the invention. Figure 5 shows a functional block diagram in accordance with a third specific example of implementation of the video path 106. In this third specific example, the video path comprises a display controller 12 coupled to a video memory unit 14. The display controller has a first input coupled to the first input 110 of the video path for receiving a first display signal and a second input coupled to the second input 108 of the video path for receiving a second signal derived from a television signal. The display controller is operative to release a display signal and a control signal to the output of the video path 140. In a specific example, the control signal is used to control the deflection controller 19 of the display unit 102. Alternatively, the display controller 12 comprises an active processing component for processing the input display signals 108 110 and releasing a display signal that is a combination of the two signals such as by using picture-in-picture techniques or other image processing techniques for generating visual artifacts. The functional blocks depicted in figure 5 may be implemented on a general purpose computing apparatus comprising a CPU and a memory unit or by dedicated hardware units programmed to implement a desired functionality. As a variant, the video path further

comprises a video mixer 16 coupled to the output of the display controller 12. The video mixer has a second input for receiving an external display signal in a format suitable for transmission to the display unit. The video mixer is operative to generate an output display signal. In a specific example, the video mixer comprises a switch for selectively releasing either one of the signals received from the output of the display controller 12 and from the second input receiving the external display signal.

Preferably but not essentially, the computerized television apparatus further comprises a first coupling member 130 and a second coupling member 132. The first coupling member 130 is adapted to receive a television signal and is operatively coupled to the second 108 input of the video path 106. The second coupling member 132 is operatively coupled to the computing device 104. The second coupling member 132 is adapted to receive a signal indicative of information data elements, the information data elements being suitable for use by the computing device 104. In a first specific example of implementation, the second coupling member 132 includes an Ethernet controller unit allowing the computerized television apparatus 2 to be interconnected to a data source via a computer network. In a second specific example of implementation, the second coupling member includes a modem unit allowing the computerized television apparatus 2 to be interconnected to a data source via the telephone network. In yet another specific example, the first coupling member 130 comprises a tuner device and an analog to digital converter operative for processing an analog signal received at the input of the first coupling member 130 to derive a digital

representation of the signal image. The computerized television apparatus may comprise additional coupling members allowing signal exchanges between the apparatus 2 and an external signal source to take place without detracting from the spirit of the invention.

Figure 5 shows a specific implementation of the computerized television apparatus 2. Apparatus 2 comprises a computing device comprised of a central processor (CPU) 4 which is conventionally connected to a memory unit 6, such as a RAM, and to a readable program memory 8. The apparatus further comprises a user interface unit 10 such as a keyboard, a mouse, a remote control or any other suitable device for allowing a user of the apparatus 2 to interact with the computing device. In a specific example, the interface unit 10 comprises devices peripheral to the apparatus 2 such as wireless devices allowing remotely controlling apparatus 2.

CPU 4 is linked to the video path by a coupling to the display controller 12. The display controller is coupled to a suitable temporary video memory unit 14. The display controller 12 is coupled to a first coupling member via an analog to digital converter 22. The display controller is further coupled to the video mixer 16. The video mixer 16 is coupled to a display unit such as a screen 18 to allow a visual display for the user.

Continuing with the same specific implementation, the apparatus 2 provides a first coupling member in the form of a television coupling 750. In a specific form, the first

coupling member is a tuner 20 providing a coupling between the apparatus 2 and an analog signal, the analog signal including an analog image component and an audio component. The tuner 20 is operative to extract the analog image component from a received input signal for transmission to an analog to digital converter 22. The analog to digital converter receives the analog image component and releases a digital representation of the latter, referred to as the digital image component. The digital image component is then released for processing by the display controller 12. The analog to digital converter may be further coupled to the CPU 4 for exchanging control signaling information and, optionally, for transmitting display mage information for processing by the CPU 4. The tuner 20 also transmits the audio component of the input signal to an audio controller 24 linked to an amplifier and speakers combination 26 which allows sound output for the user. Audio controllers are well known in the art to which this invention pertains and will not be described in further detail. The person skilled in the art will readily observe that the tuner 20 may also be used to receive radio frequency waves, for emission through speakers 26 as conventional radio sound waves.

In a firm form, the second coupling member is an Ethernet controller 28 adapted to be linked to a local computer network system by means of a suitable connector 30. In a second form, the second coupling member is a modem device 32, adapted to be linked through a suitable connector 34 to the telephone network. The Ethernet controller 28 and the modem device 32 may be particularly useful for receiving data elements from

remote locations, such as WebPages from the worldwide web, thus allowing Internet browsing.

The apparatus 2 further comprises a controlled power input 36 to feed the components of the apparatus 2. The controlled power input 36 can be selectively activated/disactivated by the user of the apparatus 2.

It can be seen that with apparatus 2, a number of different functions can be accomplished. Indeed, the RAM and program memories 6, 8, together with CPU 4, control peripheral devices 10, and video elements 12, 14, 16, 18, 19 allow the user of the apparatus 2 to perform a wide variety of computer related operations. More specifically, the computer related operations are accomplished, at least on part, on a basis of data obtained through the local network via a second coupling member. The video mixer 16 allows selectively displaying an external display signal in a format suitable for processing by a display unit and a signal received from the display controller. The display controller 12 allows subdividing a display image into a number of different images ("picture-in-picture"), some of which may be television programs originating from a first coupling member, while simultaneously visualizing network or internet files. The software required for the apparatus 2 operation is located on program memory 8.

In accordance with a variant, the computing device 104 for generating a display signal is a fast boot-up computing device. The fast boot-up computing device includes a plurality of hardware elements. The fast boot-up computing device further comprises an initial program loader unit

comprising a data structure including a plurality of data elements associated to respective hardware elements. The fast boot-up computing device further comprises a plurality of program elements associated to respective hardware elements, the program elements being adapted to cooperate with selected ones of the hardware elements. The fast boot-up computing device is operative to process the initial program loader unit to invoke the program elements associated to the respective data elements and is operative to boot-up the computerized television apparatus. In a specific example, the boot-up of the computerized television apparatus comprises the initialization of the various BIOS, the operating system, the graphic interface and the television driver. The boot-up is effected on the basis of the initial program loader in about five (5) seconds or less.

In a specific example of implementation, the program elements are operative to implement a communication interface with their associated hardware element. In a specific example of implementation, the hardware elements are selected from the set consisting of processors, peripheral devices and memory devices. In a specific example, the program elements are stored in the program memory 8. The initial program loader unit may comprise data elements of the type:"Pentium II 300Hz; ISA bus; Logitech™ serial mouse; 64 MB RAM . . ." and so on. Each data element is in turn associated to a respective program element. For example, a program element associated to the data element "Logitech™ serial mouse" may be the driver program element for the components associated to the data element "Logitech™ serial mouse". Continuing the same specific example, upon power-up, the CPU 4 scans the data

elements in the initial program loader unit and invokes the associated program elements.

Advantageously, the use of the initial program loader unit removes the requirement to search the computerized television apparatus at power-on thereby reducing the overall booting time of the computerized television apparatus.

Although the present invention has been described in considerable detail with reference to certain preferred embodiments thereof, variations and refinements are possible without departing from the spirit of the invention. Therefore, the scope of the invention should be limited only by the appended claims and their equivalents.